ATTACHMENT A
SPECIFICATIONS
DE-RQ65-98WG31445

161-kV LIGHT DUTY STEEL POLE H-FRAME STRUCTURES

1. GENERAL: Design, detail, and provide 161-kV light duty steel pole H-frame structures, in accordance with drawing T161H 8000, complete with the following:

a. Connection bolts, nuts, and locknuts (or lockwashers).

b. Polyurethane coating for embedded portions of all pole shafts. Provide two 5-gallon containers of spare polyurethane coating, including MSDS info (provide only with first initial shipment of structures).

c. Attachments for manufacturer's standard removeable steps or step bolts on all pole shafts. Provide 600 removeable steps or step bolts with first initial shipment of structures.

d. Ground plates in accordance with drawing 41 1015.

e. Structure identification plates.

Structures may be either galvanized or weathering steel. A mixture of galvanized and weathering steel components on the same structure is not acceptable. The structures shall be delivered to various locations in SW Arizona and SE California.

2. CONTRACTOR-FURNISHED DATA AND DRAWINGS:

a. GENERAL: Use United States standard units of measurement and English words, signs, and symbols. Submit data and drawings for each type and height of structure. Include design calculations for all structure components. Drawings shall be new originals. Reproducibles of the specifications drawings are not acceptable.

Western will return one set of design data sheets which require changes and one print of each drawing marked to indicate approved or not approved and any required changes. Contractor shall change the designs and details which Western determines necessary to make the finished structures conform to these specifications.

b. DESIGN DATA: Prior to fabrication, submit for approval, the following design data tor each type and height of structure:

(1) General dimensions and weight.

(2) Computer analyses showing ultimate moment capacities and total ultimate shears, moments, and axial loads at groundline, splices, joints and other critical points.

(3) Design calculations for crossarm and connection design.

c. DRAWINGS: Prior to fabrication, submit for approval, drawings covering each type and height of structure showing the following:

(1) Dimensions.

(2) All structure components and connections, and for each structure component: mark

number, position, size, material, and location.

(3) For Each Bolted Joint: Quantity, type (grade), and size of bolts.

(4) A complete bill of materials, including hardware and weights, listing all material for one structure. Show the number of pieces required and description of each piece, including size and length. Total weight of one complete structure shall be noted.

(5) Weight, center of gravity, lifting lug locations or lifting method, and lifting point of each major structure component and of complete structure.

(6) Location, edge preparation details, and material for each shop weld, including longitudinal seam welds.

(7) Ground plate locations.

(8) Details of removeable steps or step bolts and attachments.

(9) Type and grade of material (ASTM specification) and finish (i.e., galvanized or weathering steel).

(10) Step-by-step assembly and erection instructions for all structures, referencing part numbers, bolt lengths, jacking instructions for slip joints, etc.

d. Submit two sets of data and drawings to:

(1) Western Area Power Administration
Corporate Services Office
ATTN: Bobby Hagler, Code A3920
P.O. Box 3402
Golden, CO 80401-0098.

(2) Western Area Power Administration
Desert Southwest Regional Office
ATTN: Mark DePoe, Code G5610
P.O. Box 6457
Phoenix, AZ 85005-6457

3. DESIGN REQUIREMENTS:

a. Design structures using published theories accepted by industry as good engineering practice. Design so that ultimate stresses do not exceed the material yield stress. Design yield stress for structural steel plates shall not exceed 65 ksi. Check material stresses for each loading condition shown on the drawings.

b. Pole shafts shall be closed shapes and tapered consistent with strength requirements.

c. Crossarms shall be double square or rectangular structural steel tubing. Weathering steel crossarms shall be hermetically sealed. Ends of galvanized crossarms shall be screened to prevent being inhabited by birds.

d. Braces may be open or closed shapes, and shall provide the electrical clearances shown on the drawings.

e. Weathering steel shall not be less then 3/16-inch thick, except for structure identifiation plates.

f. Galvanized steel shall not be less then 5/32-inch thick, except for structure identification plates.

g. Perform second-order (geometrically-nonlinear) elastic analyses to accommodate stresses from structure deflection (secondary bending).

h. Sections joined by slip joints shall have a minimum lap of 1.5 times the largest inside diameter of the female section. Use complete penetration welds in the female splice area. Slip joints shall be permanently restrained from movement after installation.

I. All welding shall be performed in accordance with AWS D1.1, “Structural Welding Code - Steel”. If not previously qualified, the welding procedure, welders, welding operators, and tack welders shall be qualified in accordance with AWS D1.1.

j. Galvanized structures shall be capped at the top (with galvanized steel). Weathering steel structures shall be hermetically sealed.

k. Galvanized tubular members shall have vent holes at both ends to allow air circulation after installation. Galvanized pole shafts shall have vent holes 2 feet above groundline.

l. Weathering steel structures shall be hermetically sealed.

m. Weathering steel pole shafts shall be metallized from 2 feet above groundline to bottom of shaft, then coated with polyurethane coating from 2 feet above groundline to bottom of shaft.

n. Galvanized pole shafts shall be coated with polyurethane coating from 2 feet above groundline to bottom of shaft.

o. Structure sections shall have lifting lugs or other approved method to prevent slippage of slings and ensure safe lifting and handling.

p. Design structures assuming an embedment depth of 10% of the total pole length plus 2 feet (with native soil backfill). Pole lengths shall range from 45-85 feet (in 5-foot increments).

4. MATERIAL: Structures shall be either galvanized or weathering steel. A mixture of galvanized and weathering steel components on the same structure is not acceptable.

a. POLE SHAFTS AND CROSSARMS:

(1) Weathering Steel: ASTM A 871.

(2) Galvanized Steel: ASTM A 570 or ASTM A 572.

(a) Material shall have a minimum longitudinal impact strength of 15 foot-pounds at minus 20°F as determined by the Charpy "V" Notch Impact test in accordance with ASTM A 673.

(b) Silicon content of pole shaft material shall be either below 0.06 percent or between 0.15 and 0.35 percent.

(c) Material shall be galvanized after fabrication in accordance with the ASTM A 123.

(3) Structural Tubing:

(a) Weathering Steel: ASTM A 242, ASTM A 588, or ASTM A 847.

(b) Galvanized Steel: ASTM A 500 or ASTM A 501.

b. MISCELLANEOUS STRUCTURAL STEEL:

(1) Weathering Steel: ASTM A 242, ASTM A 588, or ASTM A 871.

(2) Galvanized Steel: ASTM A 36, ASTM A 572, or ASTM A 633.

c. CONNECTION BOLTS, NUTS, LOCKNUTS, AND LOCKWASHERS:

(1) Weathering Steel:

(a) Bolts: ASTM A 325, Type 3 or ASTM A 394, Type 3.

(b) Nuts: ASTM A 563, Grade DH3.

(c) Locknuts and Lockwashers: Palnuts (regular), Type MF No. 1 (regular or square), or approved equal. Lockwashers shall be an ASTM standard suitable for the intended use. Locknuts and lockwashers shall be galvanized in accordance with ASTM A 153 and prime coated to match weathering steel finish.

(2) Galvanized Steel:

(a) Bolts: ASTM A 325, ASTM A 354, Grade BC or ASTM A 394, Type 1.

(b) Nuts: ASTM A 194, Grade 2H or ASTM A 563, Grade DH.

(c) Locknuts and Lockwashers: Palnuts (regular), Type MF No. 1 (regular or square). Lockwashers shall be an ASTM standard suitable for the intended use.

(d) Material shall be galvanized after fabrication in accordance with ASTM A 153.

d. GROUND PLATES:

(1) Weathering Steel Structures: Stainless steel conforming to an applicable ASTM standard suitable for the intended use.

(2) Galvanized Structures: ASTM A 36, ASTM A 572, or ASTM A 633.

e. U-BOLTS AND CHAIN LINKS: ASTM A 36.

f. ARC-WELDING ELECTRODES: Arc-welding electrodes shall be in accordance with AWS D1.1.

g. POLYURETHANE COATING: Corrocote II Classis as manufactured by Madison Chemical Industries, Inc., 490 McGeachie Drive, Milton, Ontario, Canada L9T 3Y5 (or approved equal).

h. REMOVABLE STEPS AND ATTACHMENTS:

(1) Removable Steps: A.B. Chance "Detachable Pole Step", catalog No. 6236 (or approved equal).

(2) Attachments: A.B. Chance "Bolt and Plate Detachable Step Attachment for Metal Pole", catalog No. T205-0425 (or approved equal).

(a) Attach the bolts to galvanized pole shafts with internally-threaded ½-inch diameter 13 UNC rivet-nutfasteners,as manufactured by Atlas Engineering, Inc., 348-A Geneva Ave., Tallmadge, OH 44278 (or approved equal).

(b) Submit details for attaching the bolts to weathering steel pole shafts. Holes shall not be drilled in weathering steel pole shafts.

(3) Material shall be galvanized after fabrication in accordance with ASTM A 153.

i. STEP BOLTS: Step bolts shall be 3/4-inch diameter with 2-inch diameter heads and shall provide a 5-inch-minimum stepping surface.

(1) Weathering Steel: ASTM A 325, Type 3 or ASTM A 394, Type 3.

(2) Galvanized Steel: ASTM A 325, ASTM A 354, Grade BC or ASTM A 394, Type 1.

(3) Step bolts shall be corrugated knurled, dimpled, or otherwise treated to minimize slipping. Coating with a skid-resistant material is not acceptable. Step bolts shall be knurled bolts as manufactured by BBC Fasteners, Inc., 4210 Shirley Lane, Alsip, IL 60658 (or approved equal).

(4) Material shall be galvanized after fabrication in accordance with ASTM A 153.

j. STRUCTURE IDENTIFICATION PLATES:

(1) Weathering Steel: ASTM A 242, ASTM A 588, or ASTM A 871.

(2) Galvanized Steel: ASTM A36 or A 572.

(3) Minimum plate thickness shall be 1/8 inch.

5. DIMENSIONAL TOLERANCES:

a. Overall Length of Structure: Minus 12 and plus 24 inches.

b. Pole Shaft Diameter: Minus 1/8 and plus 1/4 inch.

c. Length of Crossarm: Plus or minus 1 inch.

d. Length of Overlap of Slip Joint: Minus 6 and plus 12 inches.

e. Clear Dimensions: Minus 0 inch.

6. MARKING:

a. STRUCTURE COMPONENTS: Mark individual structure components with the designation shown on drawings. Stamp or weld markings into the metal before galvanizing. The markings shall be 1/2-inch minimum height and clearly legible after galvanizing. Mating pole shaft sections shall be matchmarked to ensure correct orientation.

b. STRUCTURE IDENTIFICATION PLATES: Identify each structure with one identification plate located approximately 15 feet above bottom of poles.

(1) Stamp the following information into the plates using numerals and letters not less than 1/4-inch high:

(a) Manufacturer's name.

(b) Month and year of fabrication.

(c) 161-kV Light-Duty H-frame.

(d) Total pole lengths in feet.

(e) Complete structure weight in pounds.

(f) Ultimate groundline or base moment capacity in kip-feet.

(2) Plates shall be welded all-around to the pole shafts before galvanizing. The numerals and letters shall be clearly legible after galvanizing.

7. METALLIZING:

a. GENERAL: Weathering steel pole shafts shall be metallized from 2 feet above groundline to bottom of shaft. Metallizing shall be in accordance with AWS C2.2, "Recommended Practice for Metallizing With Aluminum and Zinc for Protection of Iron and Steel". Structures shall be metallized with zinc and have a minimum coating thickness of 6 mils. Zinc shall have a minimum purity of 99.9 percent.

b. SURFACE PREPARATION: After fabrication, blast clean steel in accordance with Steel Structures Painting Council Surface Preparation Specification SSPC-SP 5, "White Metal Blast Cleaning".

8. WEATHERING STEEL FINISH:

After fabrication, blast clean steel in accordance with Steel Structures Painting Council Surface Preparation Specifications as follows:

a. Top of Structure to 2 Feet Above Groundline: SSPC-SP 7, "Brush-Off Blast Cleaning".

b. Two Feet Above Groundline to Bottom of Structure: SSPC-SP 5, "White Metal Blast Cleaning".

9. POLYURETHANE COATING:

a. GENERAL: Minimum coating thickness and surface preparation shall be in accordance with manufacturer's recommendations. Top edge of coating shall be feathered, in lieu of masked, to prevent flaking.

Take precautions to prevent blistering of polyurethane coating. Damaged or blistered coating shall be repaired in accordance with manufacturer's recommendations prior to structure installation.

Polyurethane coating shall not be applied to ground plates.

b. Coat all pole shafts with polyurethane coating from 2 feet above groundline to bottom of shaft. Coat weathering steel shafts after metallizing.

10. HANDLING AND TRANSPORTING:

a. HANDLING: Handle and transport steel structures to avoid bending or damage. Bent pieces may be used only if they are straightened without damage to the material. Pieces bent beyond repair shall be replaced. Material with damaged galvanizing or polyurethane coating shall be replaced or repaired.

Remove all corrosive and foreign material, including chalk and grease marks, from structures and internally-threaded portions of ground plates.

Ship structures unassembled; all assembly will be performed by others. Package and ship materials for individual structures as a unit. X-braces, cross-arms, knee braces, vee braces, and assembly hardware shall be banded together, packaged, and shipped on a per structure basis.

Prepare master lists for each delivery point specifying the containers comprising each package and the contents of each container.

b. DELIVERY POINT FOR 161-kV STRUCTURES:

Western Area Power Administration
Desert Southwest Region
Various locations in SW Arizona and SE California

c. DELIVERY AND UNLOADING:

(1) Deliveries shall be made on Tuesdays, Wednesdays, and Thursdays between the hours of 7:00 a.m. and 3:30 p.m. The supplier shall be responsible for unloading of all materials upon delivery. Provide wood blocking material so that unloaded materials will not be in direct contact with the ground and will remain stable (unable to roll).

(2) Upon completion of final design, deliver structure materials within 6-8 weeks after order is placed.

d. SHIPPING NOTIFICATION: Provide 2-weeks notice prior to shipping. When delivery dates have been firmed up, provide a second (48 hour) advance notice. Advance notice shall be given by calling Mark DePoe at (602) 352-2687. Shipping reports for each delivery point shall be forwarded to the following within 24 hours after shipment:

(1) Two copies via priority mail to Western Area Power Administration, Corporate Services Office, ATTN: Bobby Hagler, Code A3920, P.O. Box 3402, Golden, CO, 80401-0098, phone (303) 275-2818, FAX (303) 275-1717.

(2) One copy via priority mail to Western Area Power Administration, Desert Southwest Regional Office, ATTN: Mark DePoe, Code G5610, P.O. Box 6457, Phoenix, AZ, 85005-6457, phone (602) 352-2687, FAX (602) 352-2410.

(3) Shipping reports shall include the following:

(a) Shipping point, destination, routing, date of shipment, and estimated arrival time.

(b) Master lists described above.

(c) Material weights included with shipment.

11. DRAWING LIST

LIGHT DUTY STEEL POLE H-FRAMES:

1. T161H 8000 - 161-kV Light Duty Steel Pole H-frame

2. 41 1015 - Grounding Details - Steel and Concrete Pole Structures